cases has he found any damage done to them by woodpeckers, and, until now, the damage done has always been on the living kapok trees (*Eriodendron anfractuosum*), which are used in Java for this purpose. The piece of telegraph pole now sent is the only instance known to him of damage being done to the sound and very hard poles of the teak (*Tectona grandis*). Besides the above-mentioned woodpecker, from time to time the rare little *Picus moluccensis* was seen also among the others at work. Mr. Pasteur remarks on the great rarity of such a phenomenon: in the Paris Electrical Exhibition of 1881 there was exhibited, as a great curiosity, a telegraph pole sent from Norway, which was perforated by a hole of 7 centimetres in diameter. The Norwegian Administration was for a long time uncertain to what cause to ascribe this damage done to poles, which were otherwise quite sound, till a mere chance at last revealed woodpeckers at work. In Norway, too, another equally remarkable case of damage had been noted as done to telegraph poles by the large stones, which are heaped round their base to insure their stability in the ground, being removed and scattered, apparently without any reason. This, which was for a length of time inexplicable, was at last found to be the work of bears, who apparently mistook the sound in the timber for the buzzing of a swarm of bees. It is too much to expect of either bears or woodpeckers that they should be versed in the ways of modern science. (*Notes from the Leyden Museum*, October 1890, p. 209.)

ALGÆ LIVING IN THE SHELLS OF MOLLUSKS.—For a long time back zoologists have, in a more or less desultory and unsatisfactory manner, made known to us the occurrence, in the hard parts of both living and extinct animals, of sundry ramifying canals, which have been described as the work of vegetable parasitic forms. These forms have been found in shells, corals, sponges, in fish-scales, and, indeed, the literature of the subject is quite a large one. Until the other day, however, there was but little progress made in our knowledge of the life-history of these parasitic plants, but the researches of Reinsch (*Bot. Zeit.*, 1879), and especially of Lagerheim (*Oefver. af K. Vet. Akad. Forhand.*, 1885), marked a new era in their investigation. A memoir, recently published in the Report of the Botanical Congress held in Paris last year, from the pens of MM. Ed. Bornet and Ch. Flahault, reduces the whole subject to order, describes the method of investigation, and a number of new genera and species. As most of these minute plants grow within the calcareous shells of Mollusca, it is not possible to study their morphology, unless by decalcifying these structures; this is effected by placing them in a sufficient quantity of Perenyi's fluid, consisting of four volumes of a 10 per cent. solution of nitric acid, three of alcohol, and three of a 5 per cent. solution of chromic acid, which fluid, while it dissolves the carbonate of lime, fixes the protoplasm, and leaves it and the other cell-contents (after a good washing) in a fit state for the use of reagents or staining. The same general features seem to attend the gradual perforating of the shell-structure by these parasites. At first they penetrate just under the outer epidermis of the shell, then speedily they make further advances, until in time the greater quantity of the hard structures disappear. This will account for the gradual extinction of dead shells in tranquil bays, where they are not subject to being ground into powder by the force of the waves. In addition to marine shells, instances of the occurrence of these forms in fresh-water shells are given, and they would also seem occasionally to lead an independent existence on calcareous rocks. Of the Chlorosporeæ, the most important is *Gomontia polyrhiza*, briefly described by Bornet and Flahault in Morot's *Journal of Botany* for May 1888, but here fully described and illustrated. This plant has a minute thallus, consisting of ramifying filaments, certain cells of which become altered into sporanges, and become detached; from these issue biciliated zoospores and immobile spores (the aplanospores of Wille). The germination of these spores seems to differ; the aplanospores increase in volume, emit one or more rhizoids, and soon present an appearance resembling that of a sporangium, but smaller. Whether the zoospores conjugate or not has not yet been observed—the difficulties in the way of observation are great—but they soon give origin to filamentous growth of a bright green colour. The other species described are *Siphonocladus voluticola*, *Zygomitus reticulatus*, and *Ostreobium queketti*. Among the Phycochromaceæ are enumerated *Mastigocoleus testarum* (Lagerheim), *Plectonema terebrans*, *Phormidium incrustatum*, and *Hyella cæspitosa*—this last a very interesting species; its thallus has a great resemblance to that of the Sirosiphoniaceæ, but in reality it belongs to the Chamæsiphoniaceæ, and it has two modes of propagation—one by the ordinary dissociation of vegetative cells, and the other by the formation of spore-like bodies resulting from the division of the contents of certain cells into a great number of minute cellular spheroids, after the manner in Dermocarpa, these cells being either terminal or intercalary. Two fungoid forms are described and figured: *Ostracoblabe implexa*, for the form regarded as *Achlya ferax* by Duncan, and *Lithopythium gangliforme*. This memoir seems to open a new field for research. Without doubt many new facts, as well as new species, await the patient labours of our botanists among these shell-frequenting species, and the way is made plain for them in this memoir. (*Bull. Soc. Bot. de France*, tome xxxvi., 1890.)

THE AUSTRALIAN ABORIGINES.

IN the latest number of the Journal and Proceedings of the Royal Society of New South Wales (vol. xxiii. part 2) there are two remarkably interesting articles on the Australian aborigines. One of them is by the Rev. John Mathew, Coburg, Victoria; the other by Mr. Edward Stephens, Bangor, Tasmania. It may be worth while to give a general idea of the contents of both papers.

Of the two, that by Mr. Mathew is by far the more elaborate. It represents the results of observation and study which have evidently been carried on for many years. A considerable part of it is devoted to the question, Who are the Australian aborigines? and about this he has much to say that must command the attention of ethnologists. He holds that the continent was first occupied by a homogeneous people, a branch of the Papuan family, and closely related to the Negroes. These settlers came from the north, but whether from New Guinea or any other island of the Eastern Archipelago we have no means of knowing, because at the time of their arrival the islands to the north were probably all inhabited by people of the same blood. Mr. Mathew thinks that these first-comers, the veritable Australian aborigines, occupied all the continent; and, having spread right across to the southern shores, crossed what is now Bass's Strait, which may at that distant date have been dry land, their migration terminating in Tasmania. According to this view, the now extinct Tasmanians were a survival of the primitive Australian race; and Mr. Mathew is at great pains to mass the evidence in favour of this theory.

One of the strongest arguments against the hypothesis is that the Tasmanians differed in appearance from their neighbours across the Strait. By a careful comparison of various accounts of both races, one of which is well known to him, he has convinced himself that the physiological differences narrow down to these: that, as compared with the natives of the continent, the islanders were on the average of shorter stature, of much darker complexion, and had hair of very different quality. These differences, he thinks, are to be explained by the fact that the Australian aborigines were greatly modified by fresh settlers, whereas the Tasmanians, being separated from other races, retained their primitive characteristics. There are now various physical types in Australia, but the Papuan type has not been effaced. Mr. Mathew cites various authorities to show that there is a decided Papuan fringe on the south-eastern and western coasts, with a departure from it landwards and in the north. The hooked nose is a feature common to Papuans, Australians, and Tasmanians.

Having discussed the argument from mythology and tradition, Mr. Mathew goes on to consider the argument from implements. The Tasmanians, as warriors, were much less skilfully equipped than most Australian tribes. They possessed, for example, neither the shield nor the boomerang, nor were their weapons ornamented. But in Australia there is a people at an equally low stage; and, with regard to those who are more advanced, Mr. Mathew suggests that the arts they possess may have reached Australia after the departure of the tribes who peopled Tasmania. His conclusion, after a survey of all accessible facts, is that the arms of the Tasmanians were of the same kind as those of the lowest of the Australians; and it is, he maintains, anything but illogical to infer that the "autochthonous" Australians once used exactly the same weapons and implements as those of the islanders. By circumstances which affected only the continent, the arms and implements there were almost universally improved. The author further strengthens his case by linguistic evidence, and by reference to customs which were common to Tasmania and the whole or part of Australia.

Having thus set forth his ideas as to the earliest inhabitants of Australia, he proceeds to disentangle and identify the other elements which go to constitute the Australian race as it is now. Upon the original Papuan stock of Australia there must have been grafted a very strong scion from another and in some respects very different stem, and the union must have been effected in the remote past, the stock from which the graft came having since then altered by progressive development almost beyond identification. The new element Mr. Mathew believes to have been the Dravidian. "Although," he says, "the Australians are still in a state of savagery, and the Dravidians of India have been for many ages a people civilized in a great measure and possessed of a literature, the two peoples are affiliated by deeply-marked characteristics in their social system and by sure affinities in language." A reference to the boomerang, which is found in India as well as in Australia, is one of the means by which he endeavours to establish this connection. "We search the Malay and Papuan armouries in vain for any trace of it, and are therefore obliged to credit some other race with its introduction to Australia, unless we unnecessarily assume that it was invented here independently. The boomerang is used in Africa about the upper course of the Nile, but we need not travel so far for it across barriers that might be termed impassable, when it is obtainable so much nearer, and in a place from which a highway has led thither almost to Australia's shores. If the framework of society, and those terms which are almost as close to a man as his own name, have both been introduced from India or its neighbourhood, it requires no stretch of imagination to suppose that the boomerang came along with them."

Universal and strong as the Dravidian influence is, it is not sufficient, Mr. Mathew thinks, to account for the great divergence of the Australians from the pure Papuans in physical features and language. He maintains, however, that the phenomena can be explained by the introduction of a Malay element. Mr. Curr is of opinion that the visits of the Malays are only of recent date, and quotes the statement of a Malay, who, in 1803, professed to have been one of the first of his countrymen to visit Australia. According to Mr. Mathew, the evidence of this Malay, whose historical knowledge must have been very limited, is overborne by the physique of the people, in the north especially, but elsewhere as well; by the naturalization of a number of important Malay words, such as the term for "teeth," a change which mere visitors could not effect; and, further, by faces of the Malay type and pure Malay words appearing in localities far removed from casual intercourse, as, for instance, in the extreme east and west. The admixture of Malay blood is supposed to account for the difficulty "that a race such as the Australian, with a Papuan basis, should have the hair straight or wavy, and not woolly. One even cross of a woolly-haired with a straight-haired race would hardly have transmitted such straightness of hair to posterity; but if, after a first cross, the fresh invasions, though only in scant filtrations, were of straight-haired people, the effect of the mingling of two straight-haired races with one the hair of which was woolly, would surely be to make the spirals uncurl."

In so far as the succession and distribution or commingling of different races are concerned, Mr. Mathew suggests that the peopling of Australia may be compared with that of Great Britain. Taking the word "Celtic" in the widest sense, he says:—"The Celtic element in Britain is represented by the Papuan in Australia, the Saxon by the Dravidian, the Norman by the Malay. In both cases, population has poured in mainly on one side, the earliest settlers gradually retiring to the further shore. The second race takes entire possession of the centre, shedding the indigenes to either side. Wales and Cornwall might correspond to Victoria, the Isle of Man to Tasmania, not in relative position to the mainland, but in isolation and racial purity, and the Highlands of Scotland would represent Western Australia. In each case, from the first two races the bulk of the people is sprung, and the vocabulary and grammar are inherited; while the third race, sprinkled here and there over the land, has left the slightest lingual traces of its presence."

Dealing with the physical appearance of the natives, Mr. Mathew shows that it is subject to considerable variation, not only in different localities, but even in the same community, and this as regards stature, muscular development, cast of feature, and other particulars. In his opinion the Australians exhibit powers of mind "anything but despicable." In schools it has often been observed that aboriginal children learn quite as easily and rapidly as children of European parents. For three consecutive years the aboriginal school at Ramahyuck, in Victoria, stood the highest of all the State schools of the colony in examination results, obtaining 100 per cent. of marks. But the limit of the native's range of mental development is soon reached; and he has "an inherent aversion to application." He has a strong propensity to mimicry, and "it is astonishing how easily and completely young blacks, not cut off from intercourse with their relatives, but living and working constantly among the whites, fall into European modes of thought." They are not wantonly untruthful, or deficient in courage, or excessively selfish, and they are "by no means lacking in natural affection." But they have no stability, so that their moral qualities are prone to operate capriciously. An almost universal feature of the aboriginal character is "gaiety of heart"; and Mr. Mathew believes this to be a Papuan inheritance. The black is a very vain man, and it is "perhaps as much owing to his vanity or his fondness for praise as to any other motive that he has been got to work at all."

The paper includes instructive paragraphs on dwellings, clothing, implements, food; government, laws, institutions; marriage, man-making, mutilations, burial customs; art, corroborees, sorceries, superstitions; and the Australian languages. Speaking of the magicians called "doctors," corresponding to the medicine-men and rain-makers of other barbarous peoples, Mr. Mathew says:—"The power of the doctor is only circumscribed by the range of his fancy. He communes with spirits, takes aërial flights at pleasure, kills or cures, is invulnerable and invisible at will, and controls the elements. I remember a little black boy, when angry, threatening me with getting his father to set the thunder and lightning agoing. The same boy told me seriously that on the occasion of a raid being made upon the blacks' camp by the native police, one of his fathers—a doctor—lifted him and pitched him a mile or two into the scrub, and vanishing underground himself, reappeared at the spot where the boy alighted." The Australians have "an apprehension of ghosts rather than a belief in them." In the tribe with which Mr. Mathew is best acquainted, they had a term for ghosts, and thought that departed spirits were sometimes to be seen among the foliage; but "individual men would tell you upon inquiry that they believed that death was the last of them." A ghost was called a "shadow," and the conception of its existence was "shadowy" like itself. "The Kabi tribe deified the rainbow—a superstition apparently confined to this people. He lived in unfathomable water-holes in the mountains, and when visible was in the act of passing from one haunt to another. He was accredited with exchanging children, after the fashion of the European fays."

Of Mr. Stephens's paper we have not space to say much. It is of special interest, because it is nearly half a century since he landed, a lad with his parents, in the infant colony of South Australia; and since that time he has had many opportunities of observing the natives. He does not at all agree with those who think that the Australians are "a naturally degraded race." Those who talk in this way, he says, either do not speak from experience, or judge the aborigines by what "they have become when the abuse of intoxicants and contact with the most wicked of the white race have begun their deadly work." "As a rule, to which there are no exceptions, if a tribe of blacks is found away from the white settlement, the more vicious of the white men are most anxious to make the acquaintance of the natives, and that, too, solely for purposes of immorality. The native women have hearts to break, and the native men outraged honour to vindicate, and these have ever been the chief factors in the so-called atrocities of the aborigines of Australia. I saw the natives, and was much with them, before these dreadful immoralities were well known. I saw them, and was often with them, when the old died off, and the race no longer propagated itself; and I say fearlessly that nearly all their evils they owed to the white man's immorality and to the white man's drink."

Mr. Stephens has a very favourable opinion of the capacity of the Australians for mental improvement. A full-blooded native, called Cottrel, whom he knew, was "an agreeable companion, interesting in conversation, full of anecdote and adventure." He married a white woman, and settled comfortably, near the

Bremer, on land given to him by the South Australian Government. "To see him track, or smell the tracks of his own bullocks that had gone astray with a number of others, was a sight long to be remembered"; and he never failed to find them.

An odd and significant incident which occurred long ago is described by Mr. Stephens. Some men of the eastern tribes called at his father's house on their way inland. "There being only my mother and myself at home, and the nearest neighbour some distance away, the men became very bold and bodily entered the house. We had a nice lively little magpie at the time, which we had tamed and taught to say a few words, and to whistle 'There's nae luck about the house,' &c. The magpie hid himself under the sofa, and, singularly incredible as it may appear, it, in a rich, full, clear tone, whistled the tune "There's nae luck,' &c. The natives were strangely silent in a moment. In less time than it takes to pen the words, little mag was out from his hiding-place, biting the naked toes of the savages here, there, and everywhere, and talking at a tremendous rate. They all looked like a lot of scared demons, and madly rushed for the door, as if the old general himself were after them. The door was instantly closed and bolted. The blackfellows never returned, and never knew but that the words came from an avenging spirit, and that they had had a very narrow escape."

GARDEN SCHOLARSHIPS.

IN accordance with the intention of its honoured founder, the Trustees of the Missouri Botanical Garden propose to provide adequate theoretical and practical instruction for young men desirous of becoming gardeners. It is not intended at present that many persons shall be trained at the same time, nor that the instruction so planned shall duplicate the excellent courses in agriculture now offered by the numerous State Colleges of the country, but that it shall be quite distinct and limited to what is thought to be necessary for training practical gardeners.

To this end, the following resolution was adopted by the trustees, at a meeting held on November 19, 1889:—

"*Resolved*, That there be established the number of six scholarships for garden pupils of the Missouri Botanical Garden, to be available on and after April 1, 1890, such scholarships to be awarded by the Director of the Garden on the results of competitive examination, except as hereinafter provided, to young men between the ages of 14 and 20 years, of good character, and possessing at least a good elementary English education; each scholarship to grant such privileges and be subject to such conditions as are provided below or may subsequently be provided by the Trustees of the Garden.

"Until otherwise ordered, two such scholarships shall be reserved for candidates to be named by the State Horticultural Society of Missouri, and the Florists' Club of St. Louis, respectively; provided, that such candidates shall be given scholarships only after passing satisfactory preliminary examinations, and shall be subject after appointment to all tests and regulations prescribed for other candidates and pupils, and that if the names of such candidates are not presented by the societies designated, within sixty days after such action is requested by the Director, the vacancies may be filled by him on competitive examination, as in other cases.

"Each scholarship so conferred may be held by the original recipient for a period not exceeding six years, subject to the following conditions:—

"Each garden pupil shall be required to lead a strictly upright and moral life, and shall be courteous and willing in the performance of all duties prescribed for him. He shall devote his entire time and energy to the labour and studies prescribed for him, except that from time to time he may be granted leave of absence to visit his home or for other good reason, at the discretion of the Director, provided that the aggregate of such absences in any calendar year shall not exceed thirty days. He shall also show such ability in his work and studies as to satisfy the Director that it is advantageous for the scholarship to be held by him; and from time to time he may be subject to both theoretical and practical examinations, or may be given special tasks calculated to test his knowledge or resources. Failure to meet the requirements in any one of these respects, making due allowance for extenuating circumstances, shall forfeit all claim on any scholarship, which may then be awarded to another person in the prescribed manner.

"Garden pupils, appointed as above indicated, shall be regarded as apprentices in the Botanical Garden, and as such shall be required to work in it under the direction of the head gardener, performing the duties of garden hands. They shall be successively advanced from simpler to more responsible tasks; and in such order as may seem best shall be transferred from one department of the Garden to another, until they shall have become thoroughly familiar with the work of all.

"To the end that Garden pupils shall be repaid for their services to the Garden, and that the absence of pecuniary means need not deter any young man from obtaining such training as is contemplated, each regularly appointed garden pupil holding a scholarship shall be entitled to the following wages, payable in equal instalments at the end of each fortnight: for the first year 200 dollars; for the second year, 250 dollars; and for each year after the second, 300 dollars; together with plain but comfortable lodgings convenient to the Garden.

"In order that they may have opportunity to become instructed in the theoretical part of their profession, and in subjects connected therewith, such pupils shall not be required to do manual work in the Garden for more than five hours per day after the first year, devoting the remainder of their time to the study of horticulture, forestry, botany, and entomology, under the direction of the Director of the Garden; and they shall for this purpose be granted free tuition in the School of Botany of Washington University. They shall also receive practical instruction in surveying and book-keeping, so far as a knowledge of these subjects is held to be necessary for a practical gardener charged with the management of an estate of moderate proportions.

"At the expiration of six years, the holder of a scholarship, who is recommended as practically proficient, shall be entitled to examination by the Garden Committee, in the subjects prescribed for study, and on passing such examination to the satisfaction of the Committee and Director, he shall receive a certificate of proficiency in the theory and practice of gardening signed by the Chairman of the Garden Committee and the Director of the Garden. In exceptional cases, candidates may be admitted to examination at the end of the fifth year, when this shall be deemed advisable by the Garden Committee, and on passing such examination satisfactorily, shall be entitled to a statement to that effect from the Director, and to the regular certificate on the subsequent completion of a year's work to the satisfaction of their employers."

All applicants for scholarships, whether named by the societies indicated above or not, will be examined in the following subjects so far as they are taught in the upper classes of grammar schools: English grammar, reading, writing, and spelling; arithmetic; and geography. If the number of candidates for scholarships exceeds the number of scholarships to be awarded at any time, all candidates except those named by the societies indicated will be required to pass a further competitive examination, which will cover history of the United States, English literature, algebra, German, the elements of botany, zoology, and physiology, and such other subjects as may from time to time be prescribed. It is not intended to make the passing of examinations in these last-named branches a requirement for the award of scholarships, but merely in this way to obtain a means of selecting the most deserving and able candidates when it is necessary to reject some. Hence, the Director will always use his discretion as to the importance to be attached to greater or less proficiency in any of the subjects covered by competitive examinations, as well as to the other qualifications of candidates admitted to such examinations.

Under the above provisions, the following announcement is made:—

Two scholarships will be awarded by the Director of the Garden, prior to April 1 next. In case both are not then awarded, the remainder will not be awarded until the corresponding period of the following year, and vacancies which may subsequently arise will be filled annually, after published announcement.

Applications for scholarships, to receive consideration, must be in the hands of the Director not later than March 1. The preliminary examination for all candidates will be held on Tuesday, March 3, at the Shaw School of Botany, 1724 Washington Avenue, St. Louis, between 10 a.m. and 5 p.m. If the number of applicants exceeds two, competitive examinations, based on the subjects indicated above, will be held at the same place on Friday and Saturday, March 6 and 7.